DOCUMENT RESUME

ED 097 468 CE 002 232

TITLE Orientation, Shop Tools and Equipment: Appliance

Repair -- Basic: 9023.01.

INSTITUTION Dade County Public Schools, Miami, Fla.

PUB DATE 73

NOTE 35p.; An Authorized Course of Instruction for the

Quinmester Program

EDRS PRICE MF-\$0.75 HC-\$1.85 PLUS POSTAGE

DESCRIPTORS *Appliance Repairing; Behavioral Objectives; Career

Planning; Course Content; Course Descriptions; *Curriculum Guides; *Equipment Maintenance; Hand Tools; *Industrial Arts; Interpersonal Competence; Safety; Secondary Grades; Service Occupations; *Shop

Curriculum: Technical Education

IDENTIFIERS *Quinmester Program

ABSTRACT

Presented as an introduction to appliance repair, the course is intended as an orientation in the duties, responsibilities, and career opportunities of the major appliances service technician. It also introduces the learner to the various types of tools and equipment used in this trade, and provides him an opportunity for instruction and practice in their proper use. Ninety clock hours in length, the course consists of five instructional blocks: (1) orientation, (2) major appliance service tools, (3) appliance service equipment, (4) customer relations, and (5) service related duties, followed by a post-test. Manipulative instructional methods include demonstration and shop use of actual appliances, tools, equipment and appliance components, as well as mock-ups and demonstration pieces and kits. Basic references, manufacturer's manuals, and audiovisual aids are listed in the bibliography and the appendix provides sample post-tests. (MW)



US DEPARTMENT OF HEALTH EDUCATION & ME FAME NATIONALING TO SE OF EDUCATION

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AUTHORIZED COURSE OF INSTRUCTION FOR THE



Course Outline
APPLIANCE REPAIR - BASIC - 9023
(Orientation, Shop Tools and Equipment)
Department 48 - Quin 9023.01

DIVISION OF INSTRUCTION-1973

E CCOSS S.

DADE COUNTY PUBLIC SCHOOLS 1450 NORTHEAST SECOND AVENUE MIAMI, FLORIDA 33132

Course Outline

APPLIANCE HEPAIR - BASIC - 9023 (Orientation. Shop Tools and Equipment)

Department 48 - Quin 9023.01

county office of VOCATIONAL AND ADULT EDUCATION



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Dade County Public Schools
Miami, Florida 33132

December, 1972

Published by the School Board of Dade County



Course Description

9023 48 9023.01 and Equipment
State Category County Dept. County Course
Number Number Number

This course includes introduction to shop rules and safety regulations, the proper use of tools and equipment pertaining to the trade. Career opportunities in the major appliance field, customer relations, and writing out service orders and estimating job costs are all covered, as well as shop related jobs. This is a one or two quinmester credit course.

Clock Hours: 90



PREFACE

The following quinmester course outline is presented as an introduction to Appliance Repair. It is intended that this course will orientate the student in the duties, responsibilities, and career opportunities of the major appliance service technician. It also introduces the learner to the various types of tools and equipment used in this trade, and provides him an opportunity for instruction and practice in their use.

This course may be taught in a single quinmester session (1 hour class) for 45 clock hours or in a double quinmester session (2 hour block) for 90 clock hours. In each instance the course consists of six instructional blocks, however, the double session permits the student to cover each block in more detail and also provides added opportunity in which to practice and increase his skills.

Manipulative instructional methods include demonstration and shop use of actual appliances, tools, equipment and appliance components, as well as mock-ups and demonstration pieces and kits.

Related instruction is taught through lecture, books, service and tool manuals, instructional sheets, and chalkboard presentations.

Students are expected to keep notebooks and to complete daily related and manipulative assignments; opportunity is provided for practicing newly learned manipulative arts.

An adjunct to the listed instructional methods is provided through the instructors utilization of audiovisual equipment and materials.



This outline was developed through the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee and the Vocational Curriculum Laterials Service, and has been approved by the Dade County Vocational Curriculum Committee.



TABLE OF CONTENTS with Suggested Hourly Breakdown

Pe	age
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BLOCK	
I. ORIENTATION (8 Hours) Introduction	1 1
II. MAJOR APPLIANCE SERVICE TOOLS (30 Hours) Basic Hand Tools	2 2 2
III. APPLIANCE SERVICE EQUIPMENT (25 Hours) Appliance Moving Equipment	2
IV. CUSTOMER RELATIONS (15 Hours) Telephone Communications The Service Call Fost Service	3
V. SERVICE RELATED DUTIES (12 Hours) Estimating Job Costs	3
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GOALS

Upon completion of this course, the appliance repair student must be able to demonstrate:

- 1. Knowledge of tools and equipment basic to the job skills he will be expected to perform as a major appliance service technician.
- 2. Skills in the selection and handling of tools through organized practice sessions.
- 3. Knowledge and understanding of the duties and responsibilities of the major appliance service technician, as well as being aware of opportunities in this field.
- 4. The ability to practice good customer relations in his dealings with the public.
- 5. The proper techniques of filling out "Service Orders," writing reports, estimating job costs, and other service related duties.



SPECIFIC BLOCK OBJECTIVES

BLOCK I - ORIENTATION

The student must be able to:

- 1. Identify and list the types of major appliances he will learn about in the Major Appliance Service course.
- 2. Describe some of the appliances used in the past: discuss their operating principles, relate and compare these to appliances of today and of the future.
- 3. List and explain the primary duties of a major appliance serviceman and the career opportunities open to him.
- 4. Work, study and act in a safe and proper manner, thereby demonstrating his understanding of school and shop rules and regulations

BLOCK II - MAJOR APPLIANCE SERVICE TOOLS

The student must be able to:

- 1. Name and describe the function of all hand tools used by the major appliance serviceman.
- 2. Use hand tools in a safe and correct manner while assembling and disassembling various major appliance components.
- 3. Remove all hand tools considered unsafe for use from his tool box or tool inventory.
- 4. Dress or sharpen his tools keeping them clean, rust free end in excellent working condition.
- 5. Name and describe the function of all bench and power tools used by the major appliance serviceman.
- 6. Use all bench and power tools in a safe and correct manner while performing various manipulative assignments requiring the use of these tools.
- 7. Connect or insert the proper attachment, accessory or drill bit for the job at hand.
- 8. Select and use the appropriate safety device and observe the proper safety precautions when working with a bench or power tool.
- 9. Name and describe the functions and reasons for using special purpose tools.

BLOCK III - APPLIANCE SERVICE EQUIPMENT

The student must be able to:

- Select and use the appropriate appliance moving device when moving from one location to another: a washer, a refrigerator, an air conditioner and a range.
- 2. Point out, name and describe the function of the service equipment at the refrigeration charging station.



3. Differentiate between "testing" and "measuring" equipment and explain under what circumstances one or the other is used.

BLOCK IV - CUSTOMER RELATIONS

The student must be able to:

- 1. Take a customer's call, handle the complaint and set up a service appointment, demonstrating and practicing this procedure under simulated conditions.
- 2. Display correct and accepted procedures in dealing with the customer when inquiring about the complaint, explaining the
- repairs needed and the estimated charges when making a service call.

BLOCK V - SERVICE RELATED DUTIES

The student must be able to:

- 1. Estimate and compute job costs of various repairs involving: time, labor and parts; installed exchange items; and items covered under different service policy forms.
- 2. Write out a "serviceman's Report" containing all required information, in a concise industry acceptable form.
- 3. Itemize by part and stock number all parts used on a job, and compute with accuracy all charges including labor and credits.
- 4. Write out customer information on a "Service Order" including all required data in a clear and legible hand.

BLOCK VI - QUINMESTER FORF-TENT

The student must be able to:

1. Satisfactorily complete the quinmester post-test.



APPLIANCE REPAIR - BASIC - 9023 (Orientation, Shop Tools and Equipment)

Department 48 - Suin 9023.01

I. ORIENTATION

- A. Introduction
 - 1. Types of Appliances
 - a. Automatic washers
 - b. Automatic dryers
 - c. Gas and electric ranges
 - d. Dishwashers
 - e. Mater heaters
 - f. Domestic refrigerators
 - g. Room air conditioners
 - 2. The past, present, and future of major appliances
 - 3. Duties of the major appliance serviceman
 - a. Installation of appliances
 - b. Diagnosing and analyzing appliance malfunctions
 - c. Rebuilding, replacing and repairing appliance components
- B. Student Responsibilities
 - 1. Safety regulations
 - a. Identifying existing and potential safety hazards
 - b. Morking with others
 - (1) Taking nothing for granted
 - (2) Knowing what your partner is doing at all times
 - (3) Understanding each others instructions
 - c. Shop and school safety rules
 - 2. Shop regulations:
 - a. Care of tools and equipment
 - b. Reporting lost or damaged articles
 - c. Clean-up assignments
 - d. Shop and school rules
- C. Course Benefits
 - 1. Career opportunities
 - a. Installer
 - b. Shop man
 - c. Outside service technician
 - d. Field supervisor
 - e. Service manager
 - 2. Learning and improving basic skills
 - a. Identifying tools
 - b. Using tools properly

II. MAJOR APPLIANCE SERVICE FOOLS

A. Basic Hand Tools

- BEST COPT AVAILABLE
- 1. Types of hand tools
 - a. Irenches
 - b. Pliers
 - c. Screwdrivers
 - d. sockets and nutdrivers
 - e. Ratches
 - f. Saws
 - g. Files
 - h. Chisels and punches
 - 1. Hammers and mallets
- 2. Using hand tools
 - a. Selecting the proper tool for the job
 - b. Correct and proper handling of tools in use
- 3. Safety factors
 - a. Identifying tools unsafe for use
 - b. Identifying unsafe tool handling practices
- 4. Care and maintenance of hand tools
 - a. Dressing, sharpening and shaping
 - b. Cleaning and protecting from rust
- B. Bench and Power Tools
 - 1. Types of bench and power tools
 - a. Arbor press
 - b. Bench grinder
 - c. Electric hand drill
 - d. Drill press
 - e. Fower hand saws
 - 2. Using bench and power tools
 - a. Correct and proper handling of bench and power tools
 - b. Use of attachments and power tool accessories
 - 3. Safety factors
 - a. Wearing and use of protective devices
 - b. Guarding against electric shock
 - c. Identifying unsafe tools
 - d. Horseplay and distractions
- C. Special Purpose Tools
 - 1. Refrigeration tools
 - a. Flaring and swaging tools
 - b. Tube cutting and reaming tools
 - c. Refrigeration charging tools
 - 2. Washer and dryer tools
 - a. Bearing removal and installation tools
 - b. Pump service tools
- III. APPLIANCE SERVICE EQUIPMENT
 - A. Appliance Moving Equipment
 - 1. The hand truck
 - 2. The dollie
 - 3. The flipper



III. APPLIANCE SERVICE EQUIPMENT (Contd.)

- B. Appliance Servicing Equipment
 - 1. Brazing equipment
 - a. The torch
 - b. Brazing rods, solders and fluxes
 - 2. Refrigeration servicing
 - a. The evacuation pump
 - b. The charging cylinder
 - c. Manifold and gauges
 - d. Refrigerant tanks and fittings
 - 3. Testing and measuring equipment
 - a. Electrical test meters
 - b. Appliance analyzers
 - c. Test lamps and test cords
 - d. Heat measuring devices

IV. CUSTOMER RELATIONS

- A. Telephone Communications
 - 1. Calling for service
 - a. Taking the complaints
 - b. Checking her file
 - c. Explaining the service charge
 - 2. Aaking an appointment
 - a. Filling in the call sheet
 - b. Checking your route
 - c. Radio dispatching
- B. The Service Call
 - 1. Understanding the customers complaint
 - a. Customers observations
 - b. Checking the appliance
 - 2. Diagnosing the trouble
 - a. Explaining the malfunction and the repairs needed
 - b. Explaining the charges to the customer
 - c. Explaining the guarantee or warranty
- C. Post Service
 - 1. Cleaning up servicing area
 - 2. Post checking the appliance

V. SERVICE RELATED DUTIES

- A. Estimating Job Costs
 - 1. Labor, time plus parts
 - 2. Installed exchange basis
 - 3. Service policy
 - a. Contract
 - b. Juarantee
 - c. Warranty



- The Service Order В.
 - Writing a "Berviceman's Report"
 - What you found to exist
 - That you did about it b.
 - What you told customer; what customer told you
 - Writing the charges
 - Itemize all parts used in repair
 - List labor and service charges
 - Deduct previous paid and customer credits
 - Include tax d.
 - Establish method of payment e.

 - (1) C.C.D. (2) Charge
 - (3) Send bill
 - (4) Accept deposit balance C.O.D.
 - 3. Completing the service order
 - Model and serial numbers of appliance a.
 - Part numbers of parts used or ordered
 - Customer information

 - (1) Name, address phone number(2) Date of appliance purchase and installation
 - (3) Date of last service call
 - Serviceman's and customer's signatures d.
- VI. QUINMESTER FOST-TEST

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A P P E N D I X
Quinmester Post-Test Sample

Quinmester Post-Test

Na	ame	Date	Sco	re
B1	lock I - Related Test			
Or	ach statement needs a word, a nly one of the choices listed noice you make in the space p	is correct.	Place the lett	er of the
1.	A type of major appliance room is:	most likely	to be located in	a laundry
	 a. A dishwasher b. An electric range c. An automatic dryer d. A refrigerator e. A toaster 			
2.	. A food preserving appliance	e found in a	kitchen is:	
	 a. A toaster b. An electric range c. An air conditioner d. A dishwasher e. A refrigerator 			·,
3.	. An appliance which, in add dust and pollen from the s	lition to its ir while low	main purpose, a ering humidity 1	lso filters s called:
	 a. A water heater b. An air conditioner c. An automatic washer d. A fan e. A refrigerator 			
4,	. An attachment on early was the wash load is called:	shing machine	s used to extrac	t water from
	 a. A wringer b. A roller c. A spinner d. A scrubber e. A dryer 			·
5	. Stoves of the future will process called:	likely cook	foods through a	heatless
	 a. Boiling b. Microwave radiation c. Char-broiling d. Dehydration e. Defrosting 			



- 6. A complete installation consists of installing the appliance, demonstrating the appliance and: Hooking up the appliance Levelling the appliance **b.** Clearing the appliance C. the appliance 0: d. ecking the appliance Pce. In the event of an internal short, a ground on the appliance 7. should: Cause the fuse to blow a. Prevent the fuse from blowing Cause shocks C. d. Burn out the appliance's motor Permit the appliance to operate normally e. 8. We have shop rules which must be followed in order that:
 - . We have shop rules which hast be followed in older ones
 - a. All students may be treated fairly
 - b. The shop environment maintains a good atmosphere for learning and working
 - c. Conditions in the shop are as safe as possible
 - d. We may develop the habits and disciplines which will help us to succeed in our society
 - e. All of the above are correct
 - 9. The man with the overall responsibility of operating the service department is the:
 - a. Outside service technician
 - b. Field supervisor
 - c. Shop man
 - d. Service manager
 - e. Installer
- 10. One sure mark of the good mechanic is:
 - a. He never makes mistakes
 - b. He knows how to use his tools
 - c. He knows more than his superiors
 - d. He never argues with the customers
 - e. He sets the other mechanics "straight"



Quinmester Post-Test

Nio mo	Date	score	
Name	5.00		

Block II - Manipulative Test

Each student will be assigned a work station. Each station will contain the following:

- A tool box of assorted tools including some defective tools, at least one tool which requires sharpening or cleaning, and other tools needed to properly complete his assigned tasks
- A water pump, new pump gasket and bearings 2.
- An inlet valve
- A pencil and a sheet of paper 4.

The student will perform Operations A and B in any order he desires.

Operation A

- 1. Disassemble the water pump
- 2. Remove old bearings and press in new bearings
- 3. Remove all traces of old gasket and replace
- Reassemble water pump
- On the sheet of paper, list all tools used in this operation

Operation B

- Disassemble the inlet valve
- Use the wire wheel to remove traces of corrosion on the solenoid coils and brackets
- Reassemble the valve
- 4. On the sheet of paper, list all tools used in this operation

Replace tools in tool box.

Time allowed for test: 40 minutes



Quinmester Post Test

Name	Date	Score			
Block II - Related Test					
In the left hand column you will tools." In the right hand column each tool is used for. You are or use by placing the letter on in the space provided on the left.	n is listed the "special to match the tool to its the left of the "special	. purpose" purpose			
l. Corbin pliers a.	Used for cutting pipe				
2. Yoke and block b.	Used for swaging				
3. Hack saw c.	Used for removing clam	ps			
4. Reamer d.	Used for cutting tubing	3			
5. Tube cutter e.	Used for flaring				
r.	Used for cleaning out	burrs			
Use a metal ruler to determine the diameter of the circles below. In the space next to each circle write down the size (in 32nds) of the twist drill which fits most accurately. b					
If you required a slightly large closest to:	r twist drill, which of	the above is			
1. 1 inch					
2. 3/4 inch					
3. 1/2 inch					
4. 3/8 inch					
5. 3/16 inch					



THE INSTRUCTOR SHOULD RATE THE STUDENT ON THE FOLLOWING

1.	Selected proper tools.
2.	Selected only safe tools.
3.	Cleaned or sharpened tools used, if needed.
4.	Used hand tools in a safe manner. (If not, list faults.)
5.	Used hand tools properly. (If not, list faults.)
6.	Used proper safety equipment and safe guards.
7.	Used power/bench tools in a safe manner. (If not, list faults.)
8.	Used power/bench tools properly. (If not, list faults.)

- 9. Cleans tools before putting away.
- 10. Cleans work stations.

Check student's sheet to see that he has identified and listed all tools used.

Check time

Quinmester Post Test

			•
Name	9	Date	Score
310	ck III - Related Test		
Onl	h statement needs a word, a fi y one of the choices listed is ice you make in the space prov	correct. Flace the r	number of the
1.	When it is necessary to move and to tilt it on its side or	a refrigerator only a back, it is best to u	few feet, se a:
	 a. Hand truck b. Rug or pad c. Dollie d. Flipper e. Any of the above will do 		
2.	A joining or sealing technique work" is:	e most often used in "	refrigeration
	a. Silver soldering b. Epoxeeing c. Bronze brazing d. Soft soldering e. Welding		
3.	"Flux" is used before solderi	ng to:	
	a. Remove oxide deposits and b. Remove oxide deposits and c. Prevent the metal being s d. Make the solder melt fast e. All of the above	oldered from melting	3 soldered
4.	S 'wer solder will "flow" at	approximately:	
	a. 300° b. 6 0° c. 120°° d. 1300° e. 2400°		
5.	A refrigerat of gauge which of pressure is considered as	an measure a vacuum a	s w ell as
	a. Pressure galler b. Manifold c. Vacuum gallge d. Atmospheric galler e. Compound gallge		



- 6. A device used to measure liquid refrigerant is called:
 - a. Reirigerant tank
 - b. Charging cylinder
 - c. Manifold gauge set
 - d. Graduated beaker
 - e. Gallon jug
- 7. The evacuation pump is used to create a vacuum in a refrigeration system in order to:
 - a. Fermit moisture in the system to vaporize and boil away
 - b. Remove all traces of the old refrigerant
 - c. Remove oil from the system
 - d. Clean the tubing in the system
 - e. None of the above are correct
- 8. Electrical valves, such as volts, ohms and amps may be measured by using various:
 - a. Gauges
 - b. Analyzers
 - c. Test lamps
 - d. Line test cords
 - e. Neters
- 9. A live circuit can most easily be traced using:
 - a. An ammeter
 - b. A test cord
 - c. A test lamp
 - d. A watt meter
 - e. An ohmmeter
- 10. In order to use a temperature gauge accurately, the pointer must first be set (calibrated) to:
 - a. 32°
 - b. Zero
 - c. 212°
 - d. Room temperature (ambient)
 - e. The outside temperature

Quinmester Post Test

Mame	meDate	Score
Bloc	ock IV - Related Pest	
bel'	ace a "T" in the space provided next to lieve the statement is True, and place be False.	each statement if you an "F" if you believe it
1.	Before "setting up" a service call the call should advise the customer of the	ne person taking the ne "Jervice Charge."
2.	the areat time and data that the sait	rise the customer of riceman will call.
3.	When on the phone, you should try to appliances trouble and give the custo cost.	figure out the omer an estimated
4.	If a customer claims a call is "the sand is under the service policy, you benefit of any doubt and tell her the charge.	should give her the
5.	On a "recall" you should inform the conservicement are experts and that there thing else wrong.	customer that our e is probably some-
6.	When routing your service calls it is treat all customers alike and not put before the "S.P." calls.	s good policy to the "cash" calls
7.	On making a service call you should unless an adult is present.	never enter a home
8.	It is best to complete the job before of the charges so that she has no opposite work.	e telling a customer cortunity to refuse
9.	It is a good practice to listen well complaint about her appliances, and her before you start trouble-shooting	to ask questions of
10.	If a customer has small children or posee that they are not in the room you	pets, it is best to are working in.

Quinnester Post Test

Nam	³		_ Dave		
Blo	ck V - Relat	ed Test			
	l in the misap paper for	sing word or phra	se with the	correct response	. Use
1.	A sales tax to the (Co	is added to all ounty, City, State	bills, this	money is eventua Government.	lly paid
2.	\$3.50 per l hour. How	harge is 312.95; 5 minutes; the se much should you o 25 minutes on a r	ervice charge charge for to	e covers th e firs	t 1/2
3.	You replace	rge is \$12.95, the da part which con How much, inclu	ost \$17.50; (the entire job re	quires
4.	Labor is no	e a pump for an ir ormally \$3.50 per How much, not o	15 minutes a	and you spent 30	minutes
5.	appliance.	placed a timer in The timer lists 50 per 15 minutes How much, not o	at 322.50 ar s labor chara	nd normally your ge. You spent 45	company minutes
6.	a 5 year wa and normall You spent 1	eplaced a gear cas arranty on that pa y your company ch -1/2 hour on the the customer?	art. The gea narges \$3.50	ar case lists for	or labor.
	,				

Quinmester Post Test

Name	Date		Score
Block V - Short Essay			
The student will be assigned a he has just replaced two separa relative or friend as the imagiout the SERVICE ORDER below.	ite components. Ined owner, the	Using the	name or a 11 then fill
	APPLIANCE		08371
NAME		TELEPHONE	
ADDRESS		CITY	
TYPE APPLIANCE			
SERIAL NO	DATE		
COMPLAINT			
		•	
STOCK NO. FA	41'		
The appliance was left in good	TOTAL	PARTS	
working order.	LABOR		
Customer's Signature	TAX		
All parts and labor guaranteed 90 days from this date	TOTAL		
•		<u>.</u>	
	-23-/24 Servi	ceman's Sig	mature



ANSWER KEY TO QUINNESTER POST-TEST

Block I - Related Test

- 1. c
- 2. e
- 3. b
- 4. a
- 5. b
- 6. e
- 7. a
- 8. e
- 9. d
- 10. b

Block II - Manipulative Test

Use Rating Sheet

Block II - Related Test

- 1. c a. 29/32nds 1. b
 2. e b. 31/30nds 2. a
- 3. a c. 15/30nds 3. c
- 4. f d. 11/30nds 4. d
- 5. d e. 5/30nds 5. d

Block III - Related Test

- 1. d
- 2. a
- 3. b
- 4. c
- 5. e
- 6. b
- 7. a
- 8. e
- 9. c
- 10. d

Block IV - Related Test

- 1. T
- 2. F
- 3. F
- 4. P
- 5. F
- 6. T
- 7. T
- 8. F
- 9. T
- 10. T

Block V - Related Test

- 1. State
- 2. 326.95
- 3. \$31.67
- 4. 337.50
- 5. 0
- 6. 321.00

Block V - Essay

Check for completeness